

The NQCC's Trapped Ion Team –technology development towards scalable quantum computing

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The National Quantum Computing Centre's Trapped Ion hardware team will host a variety of experimental architectures including different trap types, gate types, and atomic species. Initial internal work has been housing surface traps capable of high-fidelity, high-speed microwave gates in cryostats with a focus on modularity and autonomy for the laser and vacuum subsystems. These traps need to be loaded from ionising neutral atoms crossing the trapping volume. Laser ablation provides a thermally efficient method for neutral atom generation in cryogenics. But surface traps suffer from a weak trapping region, enabling the capture of only the slowest atoms in the ablation plume, which becomes an issue for plumes of high temperatures. The plume from various composition calcium targets is being characterised to determine the optimum conditions for efficient isotope generation. Compound targets were studied as isotopically-pure calcium is expensive and oxidises within an hour, which is not ideal for the repeated exposure involved in our system, which is optimised for rapid turn-around prototyping.

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